

WHAT IS CLAIMED IS:

1. An electric wire comprising wire elements, each said wire element including:  
a conductive portion being made of an electric conductive material; and  
a convexo-concave surface being formed on the conductive portion to provide predetermined amount of grooves or concave portions having a predetermined section with a predetermined depth extending in a direction of thickness or toward a center of the conductive portion, on the surface of the conductive portion, along lengthwise the conductive portion, wherein the wire elements are combined integrally to engage the convexo-concave surfaces of wire elements mutually.
2. The electric wire according to claim 1, wherein the conductive portion is made of any of a metal such as copper, aluminum, iron or an alloy of them, plastic with dispersed electric conductive particles, such as metal fiber or carbon black, electric conductive plastic such as electric conductive polymeric organic substance, or non-metallic electric conductors.
3. The electric wire according to claim 1, wherein the cross section of the conductive portion is formed into any shape selected from a group of round, square, rectangular, trapezoid, pentagon, hexagon, octagon or the other polygon.
4. The electric wire according to claim 1, wherein the conductive portion is made of any of a metal such as copper, aluminum, iron or an alloy of them, plastic with dispersed electric conductive particles, such as metal fiber or carbon black, electric conductive plastic such as electric conductive polymeric organic substance or non-metallic electric conductors, wherein the cross section of the conductive portion is formed into any shape selected from a group of round, square, rectangular, trapezoid, pentagon, hexagon, octagon or the other polygon.

5. The electric wire according to claim 1, wherein the cross section of the groove is formed into any of V-shape, U-shape or trapezoid.

6. The electric wire according to claim 1, wherein the conductive portion-is made of any of a metal such as copper, aluminum, iron or an alloy of them, plastic with dispersed electric conductive particles, such as metal fiber or carbon black, electric conductive plastic such as electric conductive polymeric organic substance, or non-metallic electric conductors, wherein the cross section of the groove is formed into any of V-shape or trapezoid.

7. The electric wire according to claim 1, wherein the conductive portion is made of any of a metal such as copper, aluminum, iron or an alloy of them, plastic with dispersed electric conductive particles, such as metal fiber or carbon black, electric conductive plastic such as electric conductive polymeric organic substance, or non-metallic electric conductors, wherein the cross section of the conductive portion is formed into any shape selected from a group of round, square, rectangular, trapezoid, pentagon, hexagon, octagon or the other polygon, wherein the cross section of the groove is formed into any of V-shape, U-shape or trapezoid.

8. The electric wire according to claim 1, wherein the cross section of the concave portion is formed into rectangular having elongated vertical side.

9. The electric wire according to claim 1, wherein the conductive portion is made of any of a metal such as copper, aluminum, iron or an alloy of them, plastic with dispersed electric conductive particles, such as metal fiber or carbon black, electric conductive plastic such as electric conductive polymeric organic substance, or non-metallic electric conductors, wherein the cross section of the concave portion is formed into rectangular having elongated vertical side.

10. The electric according to claim 1, wherein the conductive portion is made of any of a metal such as copper, aluminum, iron or an alloy of them, plastic with dispersed electric conductive particles, such as metal fiber or carbon black, electric conductive plastic such as electric conductive polymeric organic substance, or non-metallic electric conductors, wherein the cross section of the conductive portion is formed into any shape selected from a group of round, square, rectangular, trapezoid, pentagon, hexagon, octagon or the other polygon, wherein the cross section of the concave portion is formed into rectangular having elongated vertical side.

11. The electric wire according to claim 1, wherein one wire element has concave or convex portions of an amount of  $N$  and convex or concave portions of an amount of  $N+1$  on at least one of the surfaces of one conductive portion, and the other wire element, which engages with the one wire element, has convex or concave portions of an amount of  $N+1$  engaging with the concave or convex portions of the one conductive portion and concave or convex portions of an amount of  $N$  engaging with the convex or concave portions of the one conductive portion on the surface of the other wire element which corresponds to the surface of the one wire element.

12. The electric wire according to claim 1, wherein one wire element has concave portions of an amount of  $N$  on at least one of the surfaces of one conductive portion, and the other wire element, which engages with the one wire element, has convex portions of an amount of  $N$  engaging with the concave portions of the one conductive portion on the surface of the other wire element which corresponds to the surface of the one wire element.